Amendments to the Claims

1. (Original) A contact sensitive device comprising:

a member capable of supporting bending waves;

a sensor mounted on the member for measuring bending wave vibration in the member to determine a first measured bending wave signal;

at least a second sensor to determine a second measured bending wave signal; and

a processor configured to optimise a product of a set of corrected impulse response measurements from each sensor to determine information related to a contact.

2. (Original) A contact sensitive device according to claim 1 wherein the second measured bending wave signal is measured simultaneously with the first measured bending wave signal.

3. (Original) A contact sensitive device according to claim 1, wherein a corrected impulse response measurement is calculated by calculating a Fourier transform of the measured bending wave signal, calculating an equivalent response from a notional sensor positioned at a contact site and calculating an inverse Fourier transform of an equivalent response to provide a function to be optimised.

4. (Original) A contact sensitive device according to claim 3, wherein the optimisation includes iterative refinement of estimates of a location of the contact and a time for which the maximum value of the product is obtained.

5. (Original) A contact sensitive device according to claim 4, wherein an initial estimate of the location and the time is derived from impulse response functions whose high frequency components have been suppressed.

6. (Original) A contact sensitive device according to claim 1, wherein the processor is configured to determine the contact position by using knowledge of the periodicity of a pattern on the surface of the member.

7. (Original) A contact sensitive device according to claim 6 wherein an interval between impulses represents the time in which a contact has travelled to an adjacent feature of the pattern.

8. (Original) A contact sensitive device according to claim 1, wherein the device includes a purely passive sensor responsive to measure bending wave signals generated by an initial impact or by frictional movement of the contact.

9. (Original) A contact sensitive device according to claim 1, wherein the device includes an active sensor comprising an emitting transducer.

10. (Currently amended) A contact sensitive device according to claim 1 wherein the device ~~inclues~~ includes a dual active and passive sensor and is configured to switch between active and passive sensing modes depending on whether contact is applied to the device.

11. (Original) A contact sensitive device according to claim 10, wherein the device cycles between resting in passive sensing mode when no contact is detected, switching to active mode sensing when a contact is applied and returning to passive sensing mode once the contact is removed to wait for further contacts.

12. (Original) A method of determining information related to a contact on a touch sensitive device having a member capable of supporting bending waves, the method comprising:

measuring bending wave vibration in the member to determine a first measured bending wave signal using a sensor mounted on the member;

calculating information relating to the contact from the measured bending wave signal from the sensor;

determining a second measured bending wave signal which is measured using a second sensor; and

optimising a product of a set of corrected impulse response measurements from each sensor to determine information related to the contact.

13. (Currently amended) [[The]] A method as recited in claim 12 wherein the second measured bending wave signal is measured simultaneously with the first measured bending wave signal.

14. (Original) A method according to claim 12, wherein the corrected impulse response measurement is calculated by calculating the Fourier transform of the measured bending wave signal, calculating an equivalent response from a notional sensor positioned at the contact site and calculating the inverse Fourier transform of the equivalent response to provide a function to be optimised.

15. (Original) A method according to claim 14, wherein the optimisation includes iterative refinement of estimates of the location of the contact and the time for which the maximum value of the product is obtained.

16. (Currently amended) A ~~contact sensitive device~~ method according to claim 15, wherein an initial estimate is derived from impulse response functions whose high frequency components have been suppressed.

17. (Original) A method according to claim 12, further comprising determining the contact position by using knowledge of periodicity of a pattern on a surface of the member and wherein an interval between impulses represents a time in which the contact has travelled to an adjacent feature of the pattern.

18. (Original) A method according to claim 12, further comprising passively sensing the bending wave vibration and hence the measured bending wave signals are generated by an initial impact or by frictional movement of the contact.

19. (Original) A method according to claim 12, further comprising actively sensing the bending wave vibration using an emitting transducer.

20. (Original) A method according to claim 12 wherein the device includes a dual active and passive sensor and the method further comprises switching between active and passive sensing modes according to whether contact is applied to the device.

21. (Original) A method according to claim 20, further comprising resting in passive sensing mode when no contact is detected, switching to active mode sensing when a contact is applied and returning to passive sensing mode once the contact is removed to wait for further contacts.

22. (Original) A contact sensitive device comprising:

first means for measuring bending wave vibration in the member to determine a first measured bending wave signal;

second means for determining a second measured bending wave signal; and

means for optimising a product of a set of corrected impulse response measurements from each sensor to determine information related to a contact on the contact sensitive device.

23. (Currently amended) A contact sensitive device comprising a member capable of supporting bending waves, a sensor mounted on the member for measuring bending wave vibration in the member to determine a first measured bending wave signal and a processor which calculates information relating to [[the]] a contact position from the measured bending wave signal from the sensor, wherein a surface of the member comprises a raised pattern whereby a contact drawn across the surface provides a variable force to the member to generate bending waves in the member.

24. (Original) A contact sensitive device according to claim 23, wherein the pattern is periodic.

25. (Original) A contact sensitive device according to claim 23, wherein the pattern is quasi-periodic with a statistically well-defined spatial distribution of undulations.

26. (New) A contact sensitive device according to claim 23, wherein the raised pattern is random, whereby the contact drawn across the surface generates a random bending wave signal.

27. (New) A contact sensitive device according to claim 23, wherein the processor is configured to determine the contact position according to a periodicity of the pattern on the surface of the member and according to an interval between impulses, the interval representing a time in which the contact has travelled to an adjacent feature of the pattern.

28. (New) A contact sensitive device according to claim 23, wherein the device includes a purely passive sensor responsive to measure bending wave signals generated by an initial impact or by frictional movement of the contact.

29. (New) A contact sensitive device according to claim 23, wherein the device includes an active sensor comprising an emitting transducer.

30. (New) A contact sensitive device according to claim 23 wherein the device includes a dual active and passive sensor and is configured to switch between active and passive sensing modes depending on whether contact is applied to the device.

31. (New) A contact sensitive device according to claim 30, wherein the device cycles between resting in passive sensing mode when no contact is detected, switching to active mode sensing when a contact is applied and returning to passive sensing mode once the contact is removed to wait for further contacts.

32. (New) A contact sensitive device according to claim 23 further comprising a processor, wherein the processor applies a correction based on the dispersion relation of the material of the member supporting the bending waves, and wherein the contact sensitive device further determines a second measured bending wave signal which is measured simultaneously with the first measured bending wave signal and the processor calculates a dispersion corrected function of the two measured bending wave signals.

33. (New) A contact sensitive device according to claim 32 , wherein the calculated dispersion corrected function is an autocorrelation function.

34. (New) A contact sensitive device as according to claim 32, further comprising a second sensor measuring the second measured bending wave signal.

35. (New) A contact sensitive device as according to claim 34, further comprising a second pair of sensors to determine two additional measured bending wave signals from which a second dispersion corrected function is calculated.

36. (New) A contact sensitive device according to claim 35, wherein the processor determines from each dispersion corrected function a first difference in path-length between the contact site and each of the first and second sensors and a second difference in path-length between the contact site and each of the second pair of sensors and determines the location of the contact from the first and second differences in path-length.

37. (New) A contact sensitive device as according to claim 23, further comprising absorbers mounted around at least part of the periphery of the member to absorb reflected waves.

38. (New) A contact sensitive device as according to claim 32, wherein the processor is configured to remove the contribution of reflected waves from the measured bending wave signal.

39. (New) A contact sensitive device according to claim 38, wherein the processor comprises a low-pass filtering operator which operates on the measured bending wave signal and which comprises an averaging window having a width which varies locally with time.

40. (New) A contact sensitive device according to claim 39, wherein the processor is configured to provide an estimate for the distance between the contact site and each sensor, the estimate being substituted into a calculation to remove the reflected waves.

41. (New) A contact sensitive device as according to claim 32, further comprising multiple sensors on the member whereby multiple dispersion corrected functions are determined.

42. (New) A contact sensitive device according to claim 41, wherein the processor is configured to create a mapping function which maps the surface of the member for each dispersion corrected function.

43. (New) A contact sensitive device as according to claim 32, wherein the member is an acoustic radiator and an emitting transducer is mounted to the member to excite bending wave vibration in the member to generate an acoustic output.

44. (New) A contact sensitive device according to claim 43, further comprising means ensuring that the acoustic output and measured bending wave signals are in discrete frequency bands.

45. (New) A contact sensitive device according to claim 44, further comprising an adaptive noise canceller for removing the contribution of the acoustic output from the measured bending wave signal.

46. (New) A contact sensitive device as according to claim 23, wherein the member is transparent.

47. (New) A contact sensitive device as according to claim 32, further wherein the processor estimates a convolution correction coefficient which is applied to the dispersion corrected function thereby compensating for phase differences between the sensors.

48. (New) A contact sensitive device according to claim 32, further comprising means for recording sets of first and second measured bending wave signals each sensor over time as the contact moves across the member.

49. (New) A contact sensitive device according to claim 48, wherein the processor is adapted to analyze the measured bending wave signals as a sequence of frames of data.

50. (New) A contact sensitive device according to claim 49, wherein the processor is adapted to extract information on the contact which has been averaged over the duration of one of the frames of data.

51. (New) A contact sensitive device as according to claim 32, wherein the processor comprises an adaptive filter which calculates a convolution function between a set of first measured bending wave signals and a set of second measured bending wave signals.

52. (New) A contact sensitive device according to claim 51, wherein the processor is adapted to use a dispersion corrected convolution function to calculate information about the contact.

53. (New) A contact sensitive device comprising:

a member capable of supporting bending waves;

a sensor mounted on the member for measuring bending wave vibration in the member to determine a first measured bending wave signal;

at least a second sensor to determine a second measured bending wave measured simultaneously with the first measured bending wave signal; and

a processor configured to utilize a set of corrected impulse response measurements from each sensor to determine information related to a contact.

54. (New) A contact sensitive device according to claim 53 wherein the second measured bending wave signal is measured simultaneously with the first measured bending wave signal.

55. (New) A contact sensitive device according to claim 53, wherein a corrected impulse response measurement is calculated by calculating a Fourier transform of the measured bending wave signal, calculating an equivalent response from a notional sensor positioned at a contact site and calculating an inverse Fourier transform of an equivalent response to provide a function to be optimised.

56. (New) A contact sensitive device according to claim 55, wherein the optimisation includes iterative refinement of estimates of a location of the contact and a time.

57. (New) A contact sensitive device according to claim 56, wherein an initial estimate of the location and the time is derived from impulse response functions whose high frequency components have been suppressed.

58. (New) A contact sensitive device according to claim 53, wherein the processor is configured to determine the contact position by using knowledge of the periodicity of a pattern on the surface of the member.

59. (New) A contact sensitive device according to claim 58 wherein an interval between impulses represents the time in which a contact has travelled to an adjacent feature of the pattern.

60. (New) A contact sensitive device according to claim 53, wherein the device includes a purely passive sensor responsive to measure bending wave signals generated by an initial impact or by frictional movement of the contact.

61. (New) A contact sensitive device according to claim 53, wherein the device includes an active sensor comprising an emitting transducer.

62. (New) A contact sensitive device according to claim 53 wherein the device includes a dual active and passive sensor and is configured to switch between active and passive sensing modes depending on whether contact is applied to the device.

63. (New) A contact sensitive device according to claim 62, wherein the device cycles between resting in passive sensing mode when no contact is detected, switching to active mode sensing when a contact is applied and returning to passive sensing mode once the contact is removed to wait for further contacts.